

AMENDMENTS TO THE SPECIFICATION

Please delete the first heading following the title on page 1:

DESCRIPTION

Please delete the second heading following the title on page 1:

TECHNICAL AREA

Please replace the heading before paragraph [0006] with the following amended heading:

~~Description~~ **SUMMARY OF THE INVENTION**

Please replace paragraph [0006] with the following amended paragraph:

[0006] ~~An~~ The object of the present invention is to refine a combined sensor and heating element of the known type in such way that the manufacture is simplified still further and the material expenditure is reduced still further. ~~This object is achieved by a combined sensor and heating element having all the features of Claim 1. A vehicle seat which includes a combined sensor and heating element according to the present invention is described in Claim 18. Claims 21 and 22 relate to methods for manufacturing a sensor and heating element according to the present invention. Preferred embodiments of the present invention are described in the subclaims.~~

Please replace paragraph [0008] with the following amended paragraph:

[0008] The combined sensor and heating element of the present invention ~~distinguishes itself from the known combination element by~~advantageously provides a significantly simplified construction. The two functional elements, sensor mat and heater, are not situated above or below one another in different planes as in the known combination element, but rather in the same plane, a plane as defined in the present invention not necessarily understood to be "flat." The same plane is to be understood within the scope of the present invention in such a way that the printed conductors of both functional elements are applied to the same surface of a support film, which may possibly also be curved (during installation in a vehicle seat, for example). Preferably, they are situated at a distance from one another, so that the occurrence of an electrical

contact is reliably avoided even without further measures. The present invention is not restricted to this embodiment, however. If sufficient insulation is ensured at the intersection points, intersections of the printed conductors ~~may~~are also be conceivable. Such insulation may be implemented by applying a coating lacquer or an insulating film, for example. It is obvious that the wiring of the combined sensor and heating element to the analysis and/or power electronics, for example, may also be integrated in the printed conductor system on the carrier film surface.

Please replace paragraph [0009] with the following amended paragraph:

[0009] As a result of the simplified construction of a combined sensor and heating element (combination element) according to the present invention having a significantly reduced number of components in relation to the related art, the manufacturing method is may also be significantly simplified and further material savings ~~are~~ may be achieved. Because the number of process steps during manufacturing is able to be reduced, the risk that process errors will occur also decreases. Overall, this results in an improvement in quality. The combination element according to the present invention may therefore be manufactured simply and cost-effectively. In particular, as will be described in the following, known processes may be used for manufacturing a combination element according to the present invention.

Please replace paragraph [0010] with the following amended paragraph:

[0010] In a preferred embodiment of the present invention, the sensor system may include[[s]] seat-occupant detection sensors. Seat-occupant sensors are to be understood in the broadest sense as all sensor types which are capable of generating a signal when a seat is occupied by a person. A known group of seat-occupant sensors is pressure sensors, for example. Pressure sensors are known per se and have been described many times in the literature. Their mode of operation is essentially based on the change of electrical properties due to the effect of a weight exerted on the sensor. This may be the production of an electrically conductive connection due to pressure exerted on the sensor, or also the change of an electrical capacitance when a distance is changed by pressure being exerted. Within the scope of the present invention, both simple seat-occupant detection sensors, which may solely differentiate between the states "occupied" and "unoccupied," and also sensors which are capable of recording and/or analyzing a pressure profile may be used.

Please replace paragraph [0011] with the following amended paragraph:

[0011] In a further preferred embodiment of the present invention, the output signal of the seat-occupant detection sensor ~~is~~ may be used to switch and/or control the heating conductor system. This embodiment is suitable in particular for implementing a seat heater having a variable heating area, in which the heating area is divided into different zones, which may be switched and controlled independently of one another. Thus, for example, only those areas which are in direct bodily contact with the seated person may be heated, while the areas which are not contacted are not heated. Since there are great differences in regard to the bodily dimensions of people, the body contact surfaces are also of different sizes, so that the heating areas required for effective heating differ for different people. The present invention thus allows an intelligent seat heater, in which only the actually required areas are heated, which results in significant energy savings.

Please replace paragraph [0012] with the following amended paragraph:

[0012] In addition to the simple variation of simply turning on/off when areas of a seat are occupied or unoccupied, respectively, it is also may be possible within the scope of the present invention to set predefined heat profiles, which increase the comfort of a person located on the seat in that specific body parts are heated strongly, weakly, or not at all, possibly changing chronologically.

Please replace paragraph [0015] with the following amended paragraph:

[0015] Preferably, film switches, such as dome switches, ~~are~~ may be used as the pressure sensors. Film switches are known per se. They typically include an electrode pair situated on a carrier film, via which a contact surface, which is implemented as a dome and may be made of plastic, in particular polyester, or also metal, for example, is situated. The contact surface and/or the dome may be connected to one of the two electrodes in an electrically conductive manner. For contact surfaces or domes made of nonconductive material, such as polyester, electrically conductive connection elements which produce the electrical contact when actuated by the contact surface or the dome may also be provided in the area of the contact surface or the dome. Actuation occurs via the application of pressure. The contact surface or the dome or the switch

on the contact surface or on the dome curves inward and produces the contact to the second electrode and/or between two electrodes to be connected. Film switches are thus distinguished by a relatively simple construction and are also cost-effective to manufacture. However, "flat switches," as described in LU 90 583 A1, may also be used.

Please replace paragraph [0017] with the following amended paragraph:

[0017] The printed conductors are preferably made of copper or also of silver or carbon, produced through conductive paste printing. The same material is may be advantageously used for the heating conductor system and the sensor system. It is also may be possible, however, for the printed conductors for the heating conductor system and the sensor system to be made of different materials. The use of the same material for both functional elements has the advantage of simpler manufacturability.

Please replace paragraph [0018] with the following amended paragraph:

[0018] The heating conductor system and the sensor system on the carrier film ~~are~~ may be expediently covered using a protective layer. The protective layer may include both a plastic film and also, if a textile design of the surface is desired, for example, a nonwoven material layer. The use of a nonwoven material layer has the advantage that a desired rigidity may be achieved in addition to the protective effect. However, a combination of plastic and nonwoven materials or an extended multilayered construction may also be provided.

Please replace paragraph [0019] with the following amended paragraph:

[0019] The carrier film typically may include[[s]] a flexible plastic film, made of PI (polyamide), PEN (polyethylene naphthalate), or PET (polyethylene terephthalate), for example.

Please replace paragraph [0020] with the following amended paragraph:

[0020] The construction of a combined sensor and heating element is may be further simplified significantly if the electrical terminals of the heating conductor system and the sensor system are situated on the carrier film in such a way that they are connectable to the same terminal plugs. In particular, it is also may be advantageous if the heating conductor system and the sensor system are connectable to shared analysis and power supply electronics.

Please replace paragraph [0022] with the following amended paragraph:

[0022] A combined sensor and heating element according to the present invention is may be suitable in particular for use in a seat for a motor vehicle, only one heating zone being able to be provided in the simplest case. An intelligent seat heater having a variable heating area may require[[s]] that the heating conductors and the assigned sensors be situated on the seat surface and/or the backrest of the vehicle seat in such a way that they form heating zones which may be switched and controlled independently of one another. Especially efficient heating of the vehicle seat is may be achieved if the heating zones are tailored to the contour of a human body located on the seat.

Please replace paragraph [0025] with the following amended paragraph:

[0025] In a first method step, a coating made of a printed conductor material is applied to a carrier film, such as a flexible plastic film. The printed conductor material, which is particularly preferably made of copper, is preferably laminated onto the carrier. Subsequently, an etch resist coating is printed on the printed conductor coating. This step may possibly also be preceded by the cleaning and initial etching of the printed conductor coating. The etch resist is applied in a pattern which corresponds to the desired conductor layout. According to a preferred embodiment of the present invention, the conductor layout may also include the wiring of the combined sensor and heating element to the outside, for example, to the analysis or power supply electronics. In the etching process which now follows, the printed conductor coating is etched away down to the flexible carrier film in the areas not covered by the etch resist. The etching process is preferably performed in acid solution. Hydrochloric acid (HCl), hydrogen peroxide (H₂O₂), or a copper chloride (CuCl₂) solution is suitable for this purpose, for example. After the removal of the resist, for example, by flushing with an alkaline solution, i.e., stripping, the finished printed conductor structure is available on the carrier film. In a further method step, a protective layer, made of plastic film and/or a nonwoven material layer, may finally be applied, preferably laminated on.

Please replace paragraph [0026] with the following amended paragraph:

[0026] A further method for manufacturing the printed conductor structure is may be conductive paste printing, e.g., silver or carbon printing. If such a method is used, the etching and stripping

process is dispensed with. However, a coating and etching method, as described above, and a conductive paste printing method may also be used in combination.

Please replace paragraph [0027] with the following amended paragraph:

[0027] ~~The methods described are known and tested methods for manufacturing printed circuits.~~ These ~~known~~ methods allow the manufacture of a combined sensor and heating element according to the present invention in a particularly simple and cost-effective way. In particular, manufacturing the printed conductors for the heating conductor system and the sensor system in the same process step results in a significant method simplification in relation to the known combination element.

Please replace the first line of page 11 with the following:

~~Patent Claims~~ WHAT IS CLAIMED IS: